

WHAT IS CLAIMED IS:

1. A transmission diffraction grating body comprising:
a base material being substantially transparent with respect to
5 wavelength λ_1 and having a refractive index n_0 ;
another base material being substantially transparent with respect to
wavelength λ_1 and having a refractive index n_1 , which is formed on the base
material having a refractive index n_0 ; and
a relief diffraction grating formed on the base material having a
10 refractive index n_1 ; wherein:
the refractive indexes n_1 and n_0 satisfy the following relationship:
$$n_1 > n_0.$$
2. The diffraction grating body according to claim 1, wherein the
15 diffraction grating is formed of a concave portion and a convex portion having
rectangular-shaped cross sections, and the level difference h between the
concave portion and the convex portion satisfies the following relationship:
$$h = \lambda_1 / (n_1 - 1)$$

20 and the difference in an optical path between the concave portion and the
convex portion is set to correspond to one wavelength with respect to the
wavelength λ_1 .
- 25 3. The diffraction grating body according to claim 1, wherein the
refractive index n_1 is 1.9 or more.
4. The diffraction grating body according to claim 1, wherein a material
of the base material having the refractive index n_1 is at least one material
30 selected from the group consisting of Ta_2O_5 , TiO_2 , ZrO_2 , Nb_2O_5 , ZnS , $LiNbO_3$
and $LiTaO_3$.
5. The diffraction grating body according to claim 1, wherein the
diffraction grating is formed of a concave portion and a convex portion having
35 rectangular-shaped cross sections, and the film thickness of the base material
having the refractive index n_1 is the same as the level difference h between
the concave portion and the convex portion.

6. The diffraction grating body according to claim 1, further comprising an anti-reflection film in the interface between the base material having a refractive index n_1 and the air, and the interface between the base material
5 having the refractive index n_1 and the base material having a refractive index n_0 .

7. A transmission diffraction grating body, comprising a base material, and a relief diffraction grating formed on the base material, wherein the
10 diffraction grating body is formed of a single base material; and the refractive index n_1 of the single base material is 1.9 or more.

8. The diffraction grating body according to claim 7, wherein the diffraction grating is formed of a concave portion and a convex portion having
15 rectangular-shaped cross sections, and the level difference h between the concave portion and the convex portion satisfies the following relationship:

$$h = \lambda_1 / (n_1 - 1)$$

20 and the difference in an optical path between the concave portion and the convex portion is set to correspond to one wavelength with respect to the wavelength λ_1 .

9. The diffraction grating body according to claim 7, wherein a material
25 of the single base material is at least one material selected from the group consisting of Ta_2O_5 , TiO_2 , ZrO_2 , Nb_2O_3 , ZnS , $LiNbO_3$ and $LiTaO_3$.

10. A semiconductor laser apparatus provided with a diffraction grating body according to any one of claims 1 to 9, comprising:
30 a semiconductor laser for emitting a light beam with wavelength λ_1 and a light beam with wavelength λ_2 ; and
a photodetector for receiving the light beams emitted from the semiconductor laser and carrying out photoelectric conversion; wherein:
the diffraction grating body receives the light beam with wavelength
35 λ_2 and transmits a main beam and generates sub-beams that are \pm first order diffracted light; and
the diffraction grating body, the semiconductor laser and the

photodetector are integrated into one package.

11. An optical pick-up provided with a diffraction grating body according to any one of claims 1 to 9, comprising:

5 a first semiconductor laser light source for emitting a light beam with wavelength λ_1 ;

a second semiconductor laser light source for emitting a light beam with wavelength λ_1 ;

10 an optical system for receiving the light beam with wavelength λ_1 and the light beam with wavelength λ_2 and converging the light beam onto a microspot on the optical disk;

a diffraction means for diffracting a light beam reflected from the optical disk; and

15 a photodetector having a photo detecting portion for receiving the diffracted light diffracted by the diffraction means to output electrical signals in accordance with the amount of the diffracted light; wherein

the diffraction grating body receives the light beam with wavelength λ_2 and transmits a main beam and generates sub-beams that are \pm first order diffracted light.

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12. The optical pick-up according to claim 11, wherein the photo detecting portion comprises a photo detecting portion PD0 for receiving a +first order diffracted light from the diffraction means, and a distance d1 between the center of the photo detecting portion PD0 and the light emitting spot of the first semiconductor laser light source and a distance d2 between the center of the photo detecting portion PD0 and the light emitting spot of the second semiconductor laser light source substantially satisfy the following relationship:

30 $\lambda_1/\lambda_2 = d1/d2$.

13. The optical pick-up according to claim 11, wherein the diffraction grating body, the semiconductor laser and the photodetector are integrated into one package.

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14. An optical information apparatus provided with the optical pick-up according to claim 11, comprising:

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a focus control means with respect to an optical disk;
a tracking control means; and
an information signal detecting means; and further comprising:
a moving means for moving the optical pick-up; and
a rotation means for rotating the optical disk.